

# Inductive Limit Switches

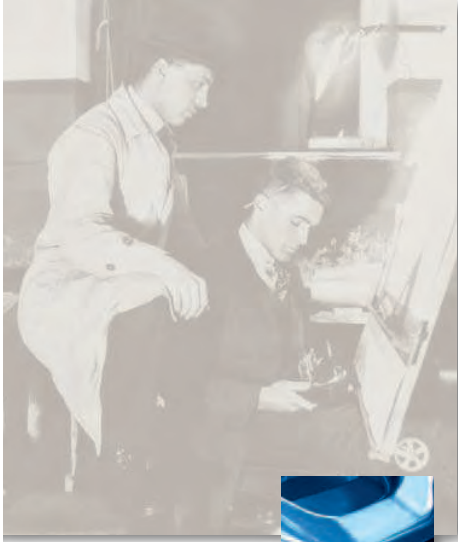


More than safety.



**EUCHNER**

# More than safety.



Emil Euchner, the company's founder and inventor of the multiple limit switch, circa 1928.



## Around the world – the Swabian specialists in motion sequence control for mechanical and systems engineering.

EUCHNER's history began in 1940 with the establishment of an engineering office by Emil Euchner. Since that time, EUCHNER has been involved in the design and development of switchgear for controlling a wide variety of motion sequences in mechanical and systems engineering. In 1953, Emil Euchner founded EUCHNER + Co., a milestone in the company's history. In 1952, he developed the first multiple limit switch – to this day a symbol of the enterprising spirit of this family-owned company.

## Automation – Safety – ManMachine

Today, our products range from electromechanical and electronic components to complex system solutions. With this wide range of products we can provide the necessary technologies to offer the right solution for special requirements – regardless of whether these relate to reliable and precise positioning or to components and systems for safety engineering in the automation sector.

EUCHNER products are sold through a world-wide sales network of competent partners. With our closeness to the customer and the guarantee of reliable solutions throughout the globe, we enjoy the confidence of customers all over the world.

## Quality, reliability, precision

Quality, reliability and precision are the hallmarks of our corporate philosophy. They represent concepts and values to which we feel totally committed.

At EUCHNER, quality means that all our employees take personal responsibility for the company as a whole and, in particular, for their own field of work. This individual commitment to perfection results in products which are ideally tailored to the customers' needs and the requirements of the market. After all: our customers and their needs are the focus of all our efforts. Through efficient and effective use of resources, the promotion of personal initiative and courage in finding unusual solutions to the benefit of our customers, we ensure a high level of customer satisfaction. We familiarize ourselves with their needs, requirements and products and we learn from the experiences of our customers' own customers.

## EUCHNER – More than safety.



Quality – made by EUCHNER

## Inductive Limit Switches

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<b>Inductive Multiple Limit Switches</b>		
Type series RGBF..12/16...	Upright housing according to DIN 43697 Proximity switch spacing 12 and 16 mm	6
Type series SN..12/16...	Upright housing with small flange Proximity switch spacing 12 and 16 mm	8
Type series GSBF..08...	Upright housing Proximity switch spacing 8 mm	10
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## General Information

Inductive multiple and single limit switches are used for positioning and control in all areas of mechanical and systems engineering. They are ideal for performing automation tasks in machines used in the wood, textile and plastics industries, as well as for area monitoring in robot installations.

Thanks to their non-contact, wear-free principle of operation, inductive multiple and single limit switches are unaffected by strong vibrations or heavy soiling and have an above-average mechanical service life even under aggressive ambient conditions.

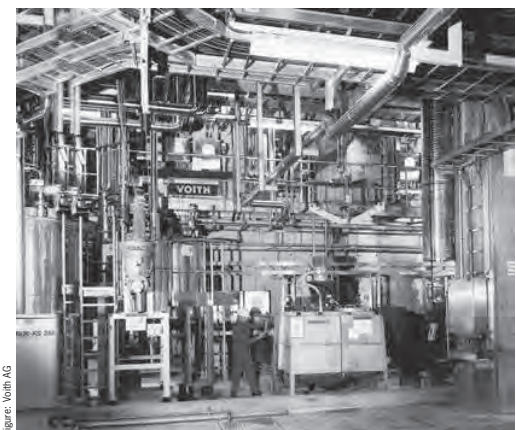
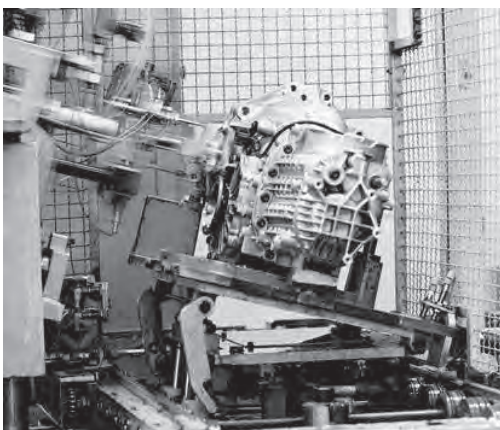
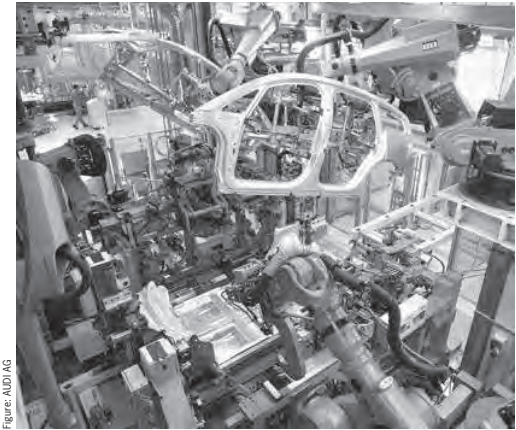
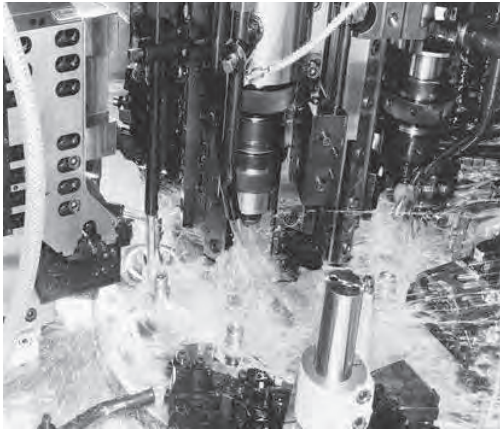
Five different inductive multiple limit switch designs with 8 mm, 12 mm or 16 mm proximity switch spacing are available to cover a wide range of applications; these can be equipped in turn with a large number of different inductive switching elements. In addition to these multiple limit switches, the product range also includes single limit switches according to DIN 43693 and the particularly compact ESN design. This flexibility ensures that a solution can be provided for practically any application.

Interchangeability with mechanical multiple and single limit switches means that machines can be converted without any problems. The switches can therefore be retrofitted on existing machine installations to take full advantage of the benefits of non-contact switches.

The multiple limit switches can also be equipped with a mixed complement of mechanical safety switching elements and inductive switching elements for safety-relevant end of travel limit switching, EMERGENCY STOP functions or other safety-critical applications. In this way, the advantages of non-contact switching can be combined with positively driven NC contacts.



## Application examples for inductive multiple limit switches



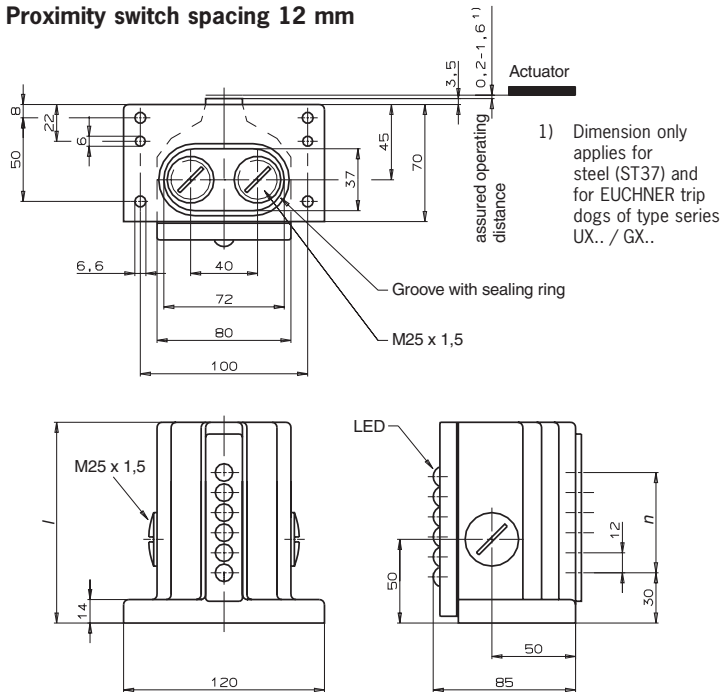


## Inductive multiple limit switches type series RGBF...

- ▶ Proximity switch spacing 12 or 16 mm
- ▶ Upright housing according to DIN 43697
- ▶ Degree of protection IP 67 according to IEC 60529

### Dimension drawing

#### Proximity switch spacing 12 mm

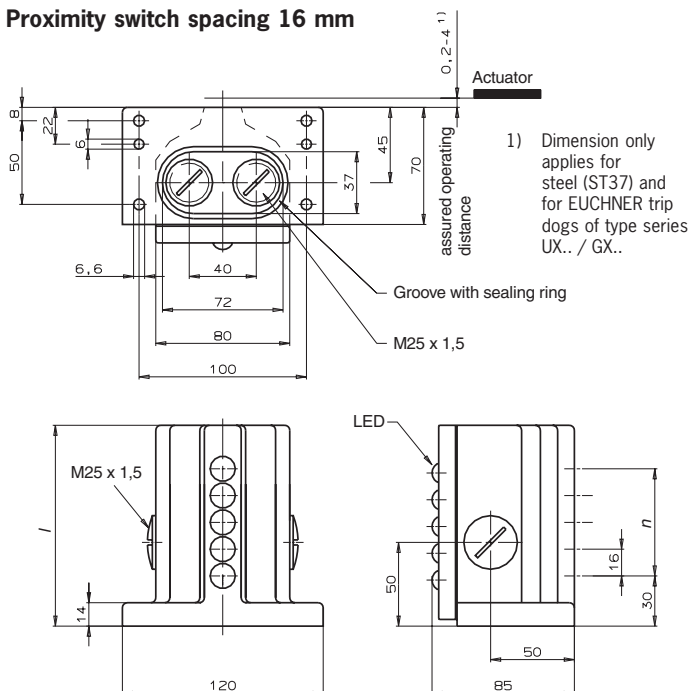


n Number of proximity switches	l	Housing material
2	70	Die-cast aluminum, anodized
3	80	
4	90	
5	105	
6	120	
8	140	
10	170	Sand-cast aluminum, anodized
12	200	
14	240	
16	240	

#### Note

- ▶ Mixed assembly with electromechanical safety switching elements according to IEC 60947-5-1 is possible for 12 mm proximity switch spacing on request.

#### Proximity switch spacing 16 mm



n Number of proximity switches	l	Housing material
2	70	Die-cast aluminum, anodized
3	90	
4	105	
5	120	
6	140	
8	170	Sand-cast aluminum, anodized
10	200	
12	240	

## Switching elements (for technical data and wiring diagrams see page 16/17)

DC								
Proximity switch spacing [mm]	Rated operating distance $s_n$ [mm]	Output PNP (positive switching) Output NPN (negative switching)	Switching function	Operating voltage [V]	LED function indicator on the switching element	Short-circuit protection, overload protection	Switching element <sup>1)</sup>	Wiring diagram No.
12	2	PNP	NO	DC 10 - 55	yes	yes	777	1
			NO + NC				781	3
		NPN	NO + NC	DC 15 - 55			780	4
			NO				790	7
		DC-2-wire (NPN/PNP)	NC	791			8	
			NO	779; 779/2 <sup>2)</sup>			1	
16	5	PNP	NO + NC	DC 10 - 55	yes	yes	772; 772/2 <sup>2)</sup>	3
			NO + NC				771; 771/2 <sup>2)</sup>	4
		NPN	NO	DC 15 - 55			on	7
			NC				request	8

Switching elements with increased operating distance on request.

AC								
Proximity switch spacing [mm]	Rated operating distance $s_n$ [mm]	Output	Switching function	Operating voltage [V]	LED function indicator on the switching element	Short-circuit protection, overload protection	Switching element <sup>1)</sup>	Wiring diagram No.
12	2	AC-2-wire	NO	AC 20 - 250	yes	-	750	9
			NC				751	10
NO	on		9					
NC	request		10					
16	5							

Switching elements according to NAMUR on request.

- When ordering single elements, please prefix the part number with ES. E.g. Switching element ES 781.
- Switching elements with 5 mm operating distance (proximity switch spacing 16 mm) are supplied with 2 different oscillator frequencies to avoid mutual interference. Multiple limit switches must therefore be equipped alternately with these switching elements.

### Ordering code

**R** **G** **B** **F**   **X**   **-**    **L** **-** **M**

Type series \_\_\_\_\_

Number of proximity switches \_\_\_\_\_

Proximity switch spacing (**12** or **16** mm) \_\_\_\_\_

Switching element No. \_\_\_\_\_

Visible LED (**L**) \_\_\_\_\_

Cable entry with metric thread M25 x 1.5 (**M**) \_\_\_\_\_

**Ordering example:** RGBF..., 6 proximity switches, LED visible from the exterior, proximity switch spacing 12 mm, NO function, DC, positive switching,  
**RGBF 06 X 12 - 777 L - M**

### Separate connector bridge

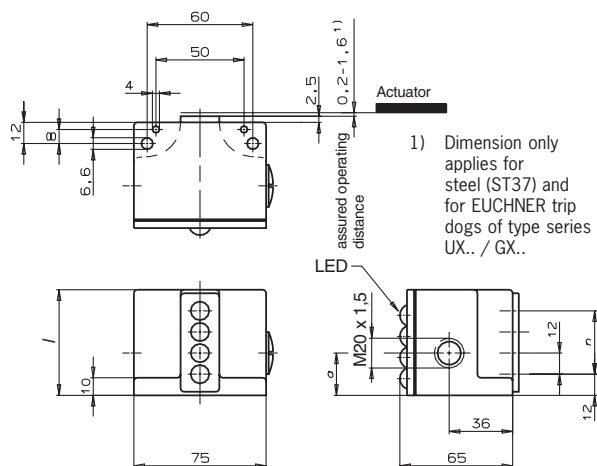
A separate connector bridge is available for making an electrical connection between individual switching elements with a common operating voltage. For ordering information see page 24.

## Inductive multiple limit switches type series SN...

- ▶ Proximity switch spacing 12 or 16 mm
- ▶ Upright housing, small flange
- ▶ Degree of protection IP 67 according to IEC 60529

### Dimension drawing

#### Proximity switch spacing 12 mm

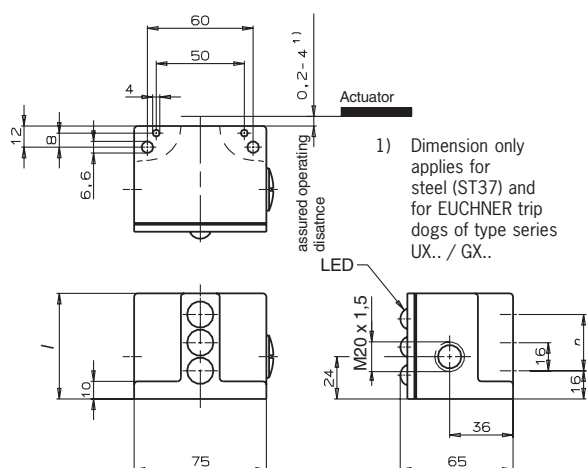


<i>n</i> Number of proximity switches	<i>l</i>	<i>a</i>	Housing material
2	36	19	Die-cast aluminum, anodized
3	48	24	
4	60		
5	72		
6	84		

#### Note

- ▶ Mixed assembly with electromechanical safety switching elements according to IEC 60947-5-1 is possible for 12 mm proximity switch spacing on request.

#### Proximity switch spacing 16 mm



<i>n</i> Number of proximity switches	<i>l</i>	Housing material
2	48	Die-cast aluminum, anodized
3	72	
4	84	



## Switching elements (for technical data and wiring diagrams see page 16/17)

DC								
Proximity switch spacing [mm]	Rated operating distance $s_n$ [mm]	Output PNP (positive switching) Output NPN (negative switching)	Switching function	Operating voltage [V]	LED function indicator on the switching element	Short-circuit protection, overload protection	Switching element <sup>1)</sup>	Wiring diagram No.
12	2	PNP	NO	DC 10 - 55	yes	yes	777	1
			NO + NC				781	3
		NPN	NO + NC	780			4	
			DC-2-wire (NPN/PNP)	NO			DC 15 - 55	790
		NC		791				8
16	5	PNP	NO	DC 10 - 55			779; 779/2 <sup>2)</sup>	1
			NO + NC				772; 772/2 <sup>2)</sup>	3
		NPN	NO + NC	771; 771/2 <sup>2)</sup>			4	
			DC-2-wire (NPN/PNP)	NO			on	7
		NC		request			8	

Switching elements with increased operating distance on request.

AC								
Proximity switch spacing [mm]	Rated operating distance $s_n$ [mm]	Output	Switching function	Operating voltage [V]	LED function indicator on the switching element	Short-circuit protection, overload protection	Switching element <sup>1)</sup>	Wiring diagram No.
12	2	AC-2-wire	NO	AC 20 - 250	yes	-	750	9
			NC				751	10
16	5		NO				on	9
			NC				request	10

Switching elements according to NAMUR on request.

- 1) When ordering single elements, please prefix the part number with ES. E.g. Switching element ES 781.
- 2) Switching elements with 5 mm operating distance (proximity switch spacing 16 mm) are supplied with 2 different oscillator frequencies to avoid mutual interference. Multiple limit switches must therefore be equipped alternately with these switching elements.

### Ordering code

**S** **N**   **X**   **-**   **L** **-** **M**

Type series \_\_\_\_\_

Number of proximity switches \_\_\_\_\_

Proximity switch spacing (**12** or **16** mm) \_\_\_\_\_

Switching element No. \_\_\_\_\_

Visible LED (**L**) \_\_\_\_\_

Cable entry with metric thread M20 x 1.5 (**M**) \_\_\_\_\_

**Ordering example:** SN..., 4 proximity switches, LED visible from the exterior, proximity switch spacing 16 mm, NO function, DC, positive switching,  
**SN 04 X 16 - 779 L -M**

### Separate connector bridge

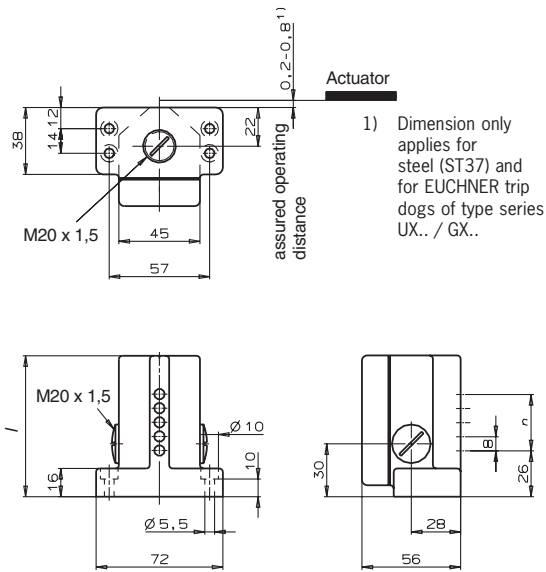
A separate connector bridge is available for making an electrical connection between individual switching elements with a common operating voltage. For ordering information see page 24.

## Inductive multiple limit switches type series GSBF...

- ▶ Proximity switch spacing 8 mm
- ▶ Upright housing
- ▶ Degree of protection IP 67 according to IEC 60529

### Dimension drawing

#### Proximity switch spacing 8 mm



<i>n</i> Number of proximity switches	<i>l</i>	Housing material
2	48	Sand-cast aluminum, anodized
3	64	
4	64	
5	80	
6	80	
8	96	
10	112	
12	128	
14	144	
16	160	
18	176	
20	192	

Gray values on request

## Switching elements (for technical data and wiring diagrams see page 16/17)

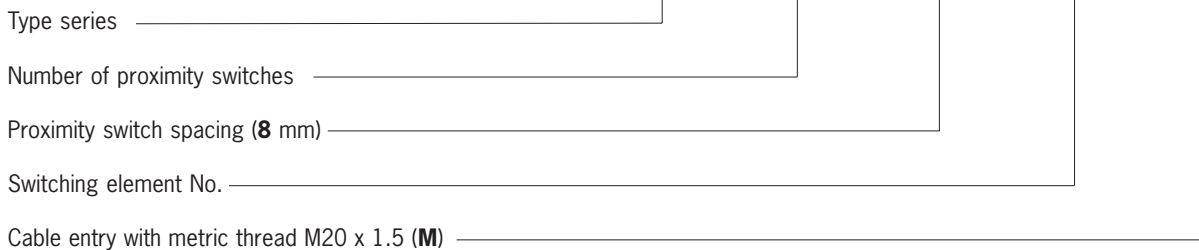
DC								
Proximity switch spacing [mm]	Rated operating distance $s_n$ [mm]	Output PNP (positive switching) Output NPN (negative switching)	Switching function	Operating voltage [V]	LED function indicator on the switching element	Short-circuit protection, overload protection	Switching element <sup>1)</sup>	Wiring diagram No.
8	1	PNP	NO	DC 10 - 30	yes	yes	785	1
			NC				786	5
		NPN	NO				on request	2
			NC				6	

Switching elements according to NAMUR on request.

1) When ordering single elements, please prefix the part number with ES. E.g. Switching element ES 785.

### Ordering code

G	S	B	F			X	0	8	-			-	M
---	---	---	---	--	--	---	---	---	---	--	--	---	---



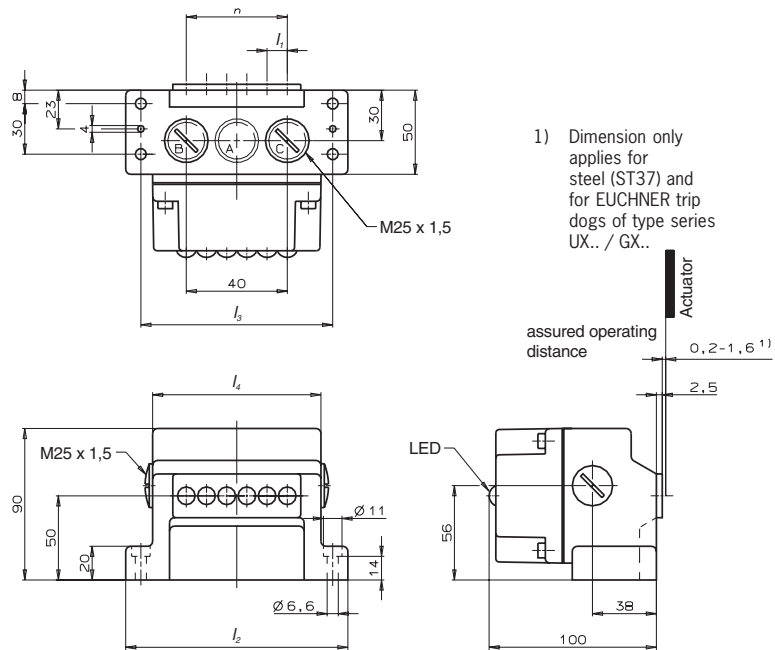
**Ordering example:** GSBF..., 12 proximity switches, NC function, DC, positive switching,  
**GSBF 12 X 08 - 786 -M**

## Inductive multiple limit switches type series GLBF...

- ▶ Proximity switch spacing 12 or 16 mm
- ▶ Horizontal housing
- ▶ Degree of protection IP 67 according to IEC 60529

### Dimension drawing

#### Proximity switch spacing 12 or 16 mm



n proximity Number of switches	Proximity switch spacing $l_1 = 12$				Proximity switch spacing $l_1 = 16$				Housing material
	$l_2$	$l_3$	$l_4$	M25x1.5	$l_2$	$l_3$	$l_4$	M25x1.5	
2	84	66	52	A	84	66	52	A	Sand-cast aluminum, anodized
3	84	66	52	A	100	82	68	A	
4	100	82	68	A	116	98	84	B + C	
5	116	98	84	B + C	132	114	100	B + C	
6	132	114	100	B + C	148	130	116	B + C	
8	148	130	116	B + C	180	162	148	B + C	
10	180	162	148	B + C	212	194	180	B + C	
12	199	178	167	B + C	244	226	212	B + C	
14	228	210	196	B + C	276	258	244	B + C	
16	244	226	212	B + C	308	290	276	B + C	
18	276	258	244	B + C	340	322	308	B + C	
20	308	290	276	B + C	-	-	-	-	

Gray values on request

## Switching elements (for technical data and wiring diagrams see page 16/17)

DC								
Proximity switch spacing [mm]	Rated operating distance $s_n$ [mm]	Output PNP (positive switching) Output NPN (negative switching)	Switching function	Operating voltage [V]	LED function indicator on the switching element	Short-circuit protection, overload protection	Switching element <sup>1)</sup>	Wiring diagram No.
12 or 16	2	PNP	NO	DC 10 - 55	yes	yes	777	1
			NO + NC				781	3
		NPN	NO + NC	780			4	
			DC-2-wire (NPN/PNP)	NO			DC 15 - 55	on request
NC		8						

AC								
Proximity switch spacing [mm]	Rated operating distance $s_n$ [mm]	Output	Switching function	Operating voltage [V]	LED function indicator on the switching element	Short-circuit protection, overload protection	Switching element <sup>1)</sup>	Wiring diagram No.
12 or 16	2	AC-2-wire	NO	AC 20 - 250	yes	-	750	9
			NC				751	10

Switching elements according to NAMUR on request.

1) When ordering single elements, please prefix the part number with ES. E.g. Switching element ES 781.

### Ordering code

**G L B F**   **X**   **-**    **L** **-** **M**

Type series \_\_\_\_\_

Number of proximity switches \_\_\_\_\_

Proximity switch spacing (**12** or **16** mm) \_\_\_\_\_

Switching element No. \_\_\_\_\_

Visible LED (**L**) \_\_\_\_\_

Cable entry with metric thread M25 x 1.5 (**M**) \_\_\_\_\_

**Ordering example:** GLBF..., 8 proximity switches, LED visible from the exterior, proximity switch spacing 12 mm, NO + NC switching function, DC, negative switching,  
**GLBF 08 X 12 - 780 L - M**

### Separate connector bridge

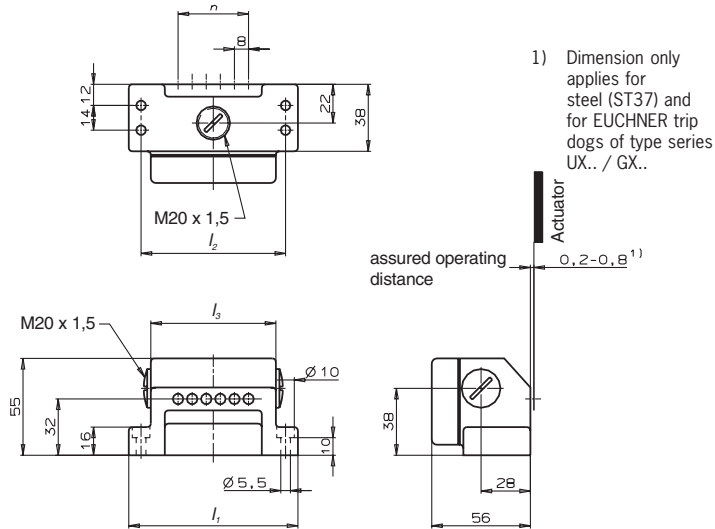
A separate connector bridge is available for making an electrical connection between individual switching elements with a common operating voltage. For ordering information see page 24.

## Inductive multiple limit switches type series GLBF...

- ▶ Proximity switch spacing 8 mm
- ▶ Horizontal housing
- ▶ Degree of protection IP 67 according to IEC 60529

## Dimension drawing

### Proximity switch spacing 8 mm



<i>n</i> Number of proximity switches	<i>l</i> <sub>1</sub>	<i>l</i> <sub>2</sub>	<i>l</i> <sub>3</sub>	Housing material
2	64	50	39	Sand-cast aluminum, anodized
3	80	66	55	
4	80	66	55	
5	96	82	71	
6	96	82	71	
8	112	98	87	
10	128	114	103	
12	144	130	119	

Gray values on request



## Switching elements (for technical data and wiring diagrams see page 16/17)

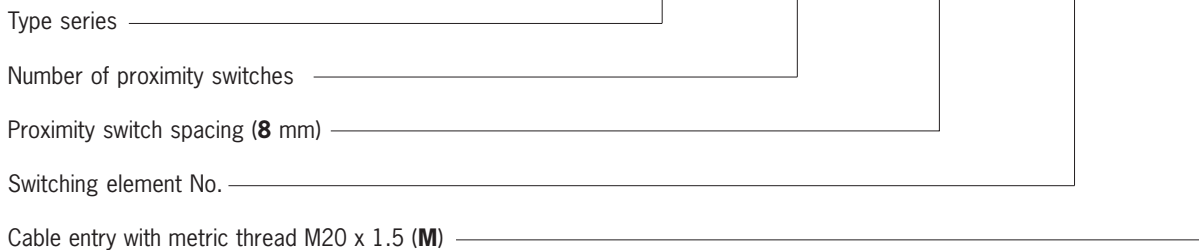
DC								
Proximity switch spacing [mm]	Rated operating distance $s_n$ [mm]	Output PNP (positive switching) Output NPN (negative switching)	Switching function	Operating voltage [V]	LED function indicator on the switching element	Short-circuit protection, overload protection	Switching element <sup>1)</sup>	Wiring diagram No.
8	1	PNP	NO	DC 10 - 30	yes	yes	785	1
			NC				786	5
		NPN	NO				on request	2
			NC				6	

Switching elements according to NAMUR on request.

1) When ordering single elements, please prefix the part number with ES. E.g. Switching element ES 785.

### Ordering code

G	L	B	F			X	0	8	-			-	M
---	---	---	---	--	--	---	---	---	---	--	--	---	---



**Ordering example:** GLBF..., 4 proximity switches, NO function, DC, positive switching,  
**GLBF 04 X 08 - 785 -M**

## Technical data on the components

Parameter	Value										Unit	
	785	786	787	788	777	781	780	779 <sup>1)</sup> 779/2	772 <sup>1)</sup> 772/2	771 <sup>1)</sup> 771/2		
Switching element ES												
Proximity switch spacing	8				12			16				mm
Rated operating distance $s_n$	1				2			5				mm
Assured operating distance $s_a$	0...0.8				0...1.6			0...4				mm
Switching function	NO	NC	NO	NC	NO	NO + NC		NO	NO + NC			
Output	PNP		NPN		PNP		NPN	PNP		NPN		
Wiring diagram	1	5	2	6	1	3	4	1	3	4		
LED function indicator	yes											
Operating voltage $U_B$	DC 10...30				DC 10...55							V
Permissible residual ripple $s$					$\leq 10$							%
Voltage drop $U_d$					$\leq 2.5$							V
Rated insulation voltage $U_i$					DC 60							V
Rated operating current $I_e$					250							mA
Off-state current $I_r$	$\leq 0.05$							$\leq 0.001$				mA
No-load current $I_0$					$\leq 15$							mA
Short-circuit and overload protection, pulsed	yes											
Reverse polarity protection	yes											
EMC compliance according to	IEC 60947-5-2											
Differential travel H (in installed state)	$\leq 0.1$				$\leq 0.2$			$\leq 0.5$				mm
Repeat accuracy R					$\leq 5$							%
Switching frequency f					$\leq 500$							Hz
Utilization category according to IEC 60 947-5-2					DC-13							
Housing material	PBT glass-fiber reinforced											
Material sensing face	PBT											
Ambient temperature T					-25 ... +70							°C
Connection type	Screw terminal											
Conductor cross-section, max.	2 x 1.5 (per contact)										mm <sup>2</sup>	

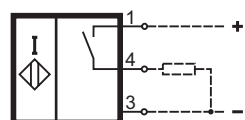
1) Switching elements with 5 mm operating distance (proximity switch spacing 16 mm) are supplied with 2 different oscillator frequencies to avoid mutual interference. Multiple limit switches must therefore be equipped alternately with these switching elements.

When ordering single elements, please prefix the part number with ES. E.g. Switching element ES 781.

Gray values on request.

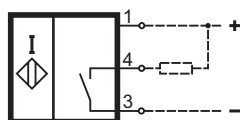
## Wiring diagrams

Wiring diagram 1



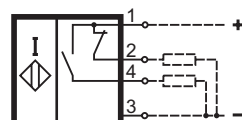
DC NO, PNP

Wiring diagram 2



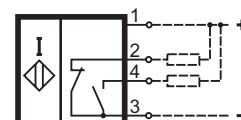
DC NO, NPN

Wiring diagram 3



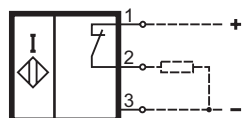
DC NO + NC, PNP

Wiring diagram 4



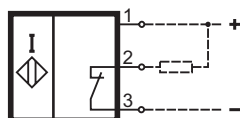
DC NO + NC, NPN

Wiring diagram 5



DC NC, PNP

Wiring diagram 6



DC NC, NPN

On request versions of the switching elements for 12 mm proximity switch spacing are available for a mixed assembly with safety switching elements according to IEC 60947-5-1.

## Technical data on the components

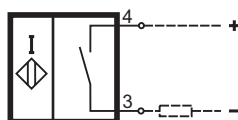
Parameter	Value										Unit	
	790	791	700 <sup>1)</sup> 700/2	701 <sup>1)</sup> 701/2	750	751	755 <sup>1)</sup> 755/2	756 <sup>1)</sup> 756/2	789	796		797 <sup>1)</sup> 797/2
Switching element ES												
Proximity switch spacing	12		16		12		16		8	12	16	mm
Rated operating distance $s_n$	2		5		2		5		1	2	5	mm
Assured operating distance $s_a$	0...1.6		0...4		0...1.6		0...4		0...0.8	0...1.6	0...4	mm
Switching function	NO	NC	NO	NC	NO	NC	NO	NC	-	-	-	
Output	DC-2-wire <sup>2)</sup> (PNP/NPN)					AC-2-wire			According to NAMUR			
Wiring diagram	7	8	7	8	9	10	9	10	11			
LED function indicator	yes								-			
Operating voltage $U_B$	DC 15...55				AC 20...250				DC 7.7...9			V
Permissible residual ripple $s$	$\leq 10$				-				$\leq 10$			%
Voltage drop $U_d$	$\leq 8$				-				-			V
Rated insulation voltage $U_i$	DC 60				AC 250				DC 60			V
Rated operating current $I_e$	50				250				-			mA
Off-state current $I_r$	$\leq 1$				$\leq 3$				-			mA
Inrush current $I_k$ (20 ms)	-				1.5				-			A
Operating current, minimum $I_m$	2				10				-			mA
Current consumption, sensing face not activated	-				-				$\geq 2.5$			mA
Current consumption, sensing face activated	-				-				$\leq 1$			mA
Short-circuit and overload protection, pulsed	yes				-				-			
Reverse polarity protection	yes				-				-			
EMC compliance according to	IEC 60947-5-2								IEC 60947-5-6			
Differential travel H (in installed state)	$\leq 0.2$		$\leq 0.5$		$\leq 0.2$		$\leq 0.5$		$\leq 0.1$	$\leq 0.2$	$\leq 0.3$	mm
Repeat accuracy R	$\leq 5$				-				-			%
Switching frequency $f$	$\leq 750$		$\leq 300$		$\leq 10$			$\leq 2000$	$\leq 1000$	$\leq 500$	Hz	
Utilization category according to IEC 60 947-5-2	DC-13				AC-140				DC-13			
Rated line frequency	-				50...60				-			Hz
Housing material	PBT glass-fiber reinforced											
Material sensing face	PBT											
Ambient temperature T	-25 ... +70											°C
Connection type	Screw terminal											
Conductor cross-section, max.	2 x 1.5 (per contact)											mm <sup>2</sup>

- 1) Switching elements with 5 mm operating distance (proximity switch spacing 16 mm) are supplied with 2 different oscillator frequencies to avoid mutual interference. Multiple limit switches must therefore be equipped alternately with these switching elements.
- 2) DC-2-wire switching elements are not suitable for inductive loads.

When ordering single elements, please prefix the part number with ES. E.g. Switching element ES 781.  
Gray values on request.

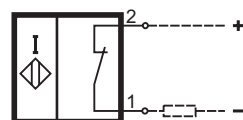
## Wiring diagrams

Wiring diagram 7



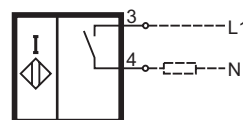
DC-2-wire, NO

Wiring diagram 8



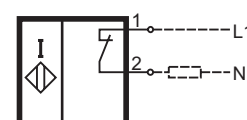
DC-2-wire, NC

Wiring diagram 9



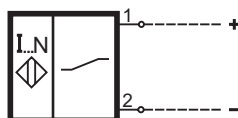
AC NO

Wiring diagram 10



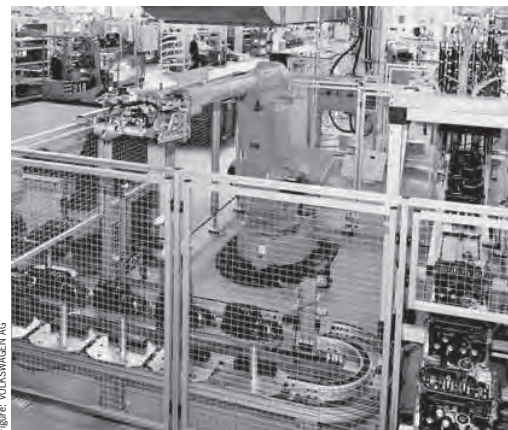
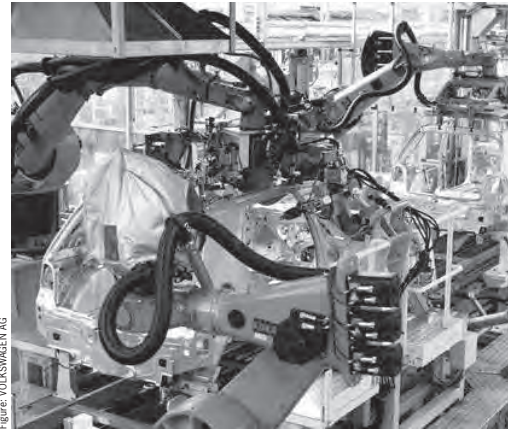
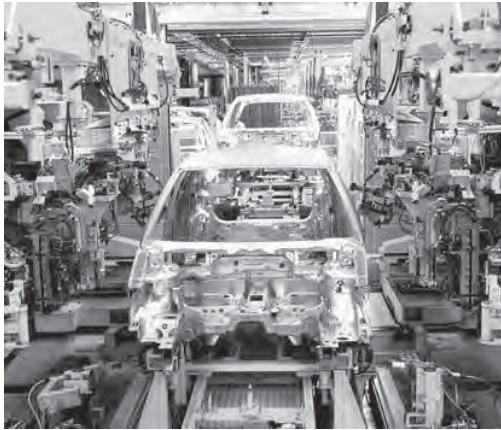
AC NC

Wiring diagram 11



According to NAMUR

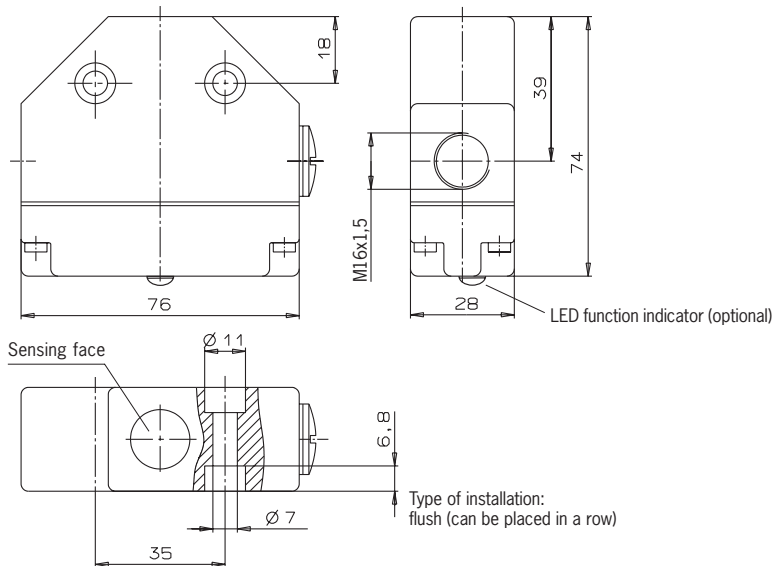
## Application examples for inductive single limit switches



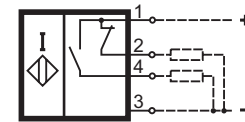
## Inductive single limit switches type series ENA...

- ▶ Housing according to DIN 43693
- ▶
- ▶

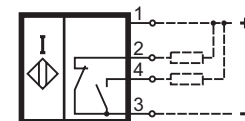
### Dimension drawing



### Wiring diagrams



DC NO + NC, PNP



DC NO + NC, NPN

### Technical data

Parameter	Value	Unit
Rated operating distance $s_n$	5	mm
Assured operating distance $s_a$	0...4	mm
Switching function	NO + NC	
Output	PNP or NPN (see Ordering table)	
LED function indicator	See Ordering table	
Operating voltage $U_B$	DC 10...55	V
Voltage drop $U_d$	$\leq 2.5$	V
Rated insulation voltage $U_i$	DC 60	V
Rated operating current $I_e$	$\leq 250$	mA
Off-state current $I_f$	$\leq 0.001$	mA
No-load current $I_0$	$\leq 15$	mA
Short-circuit and overload protection, pulsed	yes	
Reverse polarity protection	yes	
Wire break safety	yes	
EMC compliance according to	IEC 60947-5-2	
Differential travel H	$\leq 0.5$	mm
Repeat accuracy R	$\leq 5$	%
Switching frequency f	$\leq 500$	Hz
Utilization category according to IEC 60 947-5-2	DC-13	
Housing material	Die-cast aluminum, anodized	
Material for the sensing face	PBT	
Ambient temperature T	- 25...+ 70	°C
Connection type	Screw terminal	
Conductor cross-section, max.	2 x 1.5 (per contact)	mm <sup>2</sup>
Weight	0.2	kg

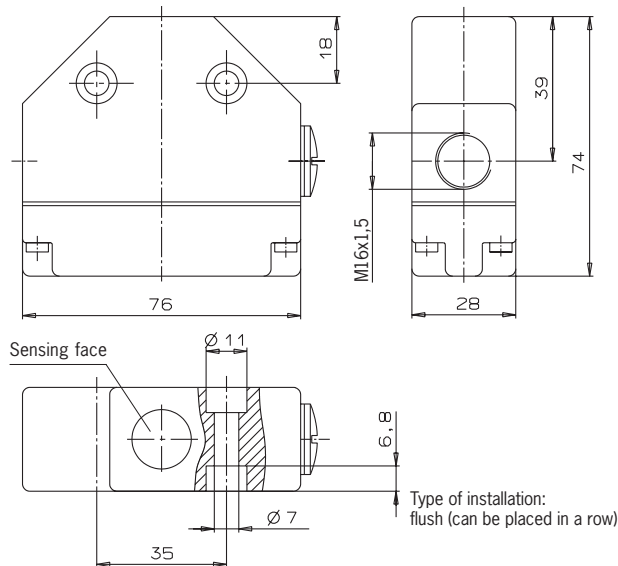
### Ordering table

LED function indicator		PNP	NPN
with	Item	ENA10B050UP048LKK10-M	on request
	Order No.	<b>ENA 086 280</b>	
none	Item	ENA10B050UP048NKK10-M	ENA10B050UN048NKK10-M
	Order No.	<b>ENA 086 099</b>	<b>ENA 086 282</b>

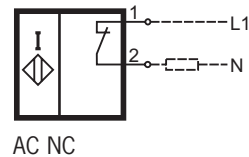
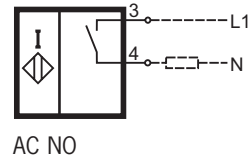
## Inductive single limit switches type series ENA...



### Dimension drawing



### Wiring diagrams



### Technical data

Parameter	Value	Unit
Rated operating distance $s_n$	5	mm
Assured operating distance $s_a$	0..4	mm
Switching function	NO or NC (see Ordering table)	
Output	AC	
LED function indicator on the switching element	yes	
Short-circuit protection	No	
Operating voltage $U_B$	AC 20...250	V
Voltage drop $U_d$	$\leq 8$	V
Rated insulation voltage $U_i$	AC 250	V
Rated operating current $I_e$	$\leq 250$	mA
Inrush current $I_k$ (20 ms)	1.5	A
Off-state current $I_r$	$110 \text{ V} \leq 1.5 \text{ 230 V}, \leq 2.0$	mA
Operating current, minimum $I_m$	5	mA
EMC compliance according to	IEC 60947-5-2	
Differential travel H	$\leq 0.5$	mm
Repeat accuracy R	$\leq 5$	%
Switching frequency f	$\leq 10$	Hz
Utilization category according to IEC 60 947-5-2	AC-140	
Rated line frequency	50 ... 60	Hz
Housing material	Die-cast aluminum, anodized	
Material for the sensing face	PBT	
Ambient temperature T	- 25...+ 70	°C
Connection type	Screw terminal	
Conductor cross-section, max.	2 x 1.5 (per contact)	mm <sup>2</sup>
Weight	0.2	kg

### Ordering table

LED function indicator	NO	NC
Item	ENA10B050AW250NNK10-M	ENA10B050RW250NNK10-M
on the switching element	Order No. <b>ENA 086 284</b>	<b>ENA 088 775</b>

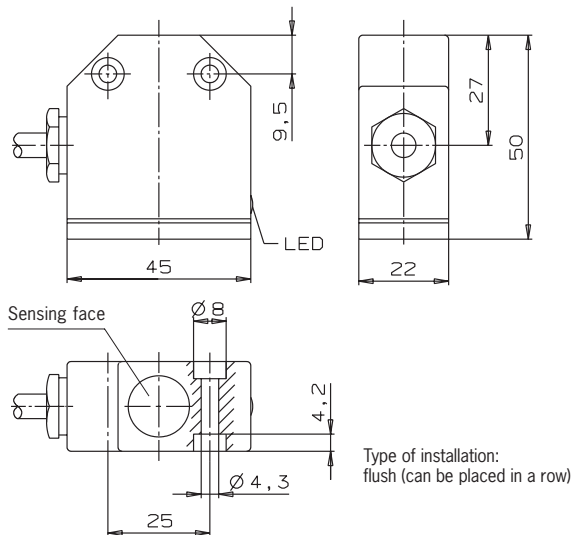
LED visible from the exterior on request.



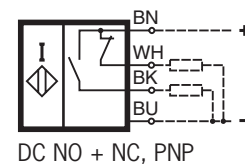
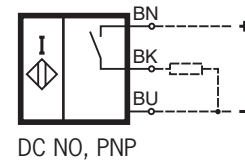
## Inductive single limit switches type series ESN...



### Dimension drawing



### Wiring diagrams



### Technical data

Parameter	Value	Unit
Rated operating distance $s_n$	5	mm
Assured operating distance $s_a$	0...4	mm
Output and switching function	PNP NO or NO + NC (see Ordering table)	
LED function indicator	yes	
Operating voltage $U_B$	DC 10...55	V
Voltage drop $U_d$	$\leq 2.5$	V
Rated insulation voltage $U_i$	DC 60	V
Rated operating current $I_e$	$\leq 250$	mA
Off-state current $I_r$	$\leq 0.05$	mA
No-load current $I_0$	$\leq 15$	mA
Short-circuit and overload protection, pulsed	yes	
Reverse polarity protection	yes	
Wire break safety	yes	
EMC compliance according to	IEC 60947-5-2	
Differential travel H	$\leq 0.5$	mm
Repeat accuracy R	$\leq 5$	%
Switching frequency f	$\leq 500$	Hz
Utilization category according to IEC 60 947-5-2	DC-13	
Housing material	Die-cast aluminum, anodized	
Material for the sensing face	PBT	
Ambient temperature T	- 25...+ 70	°C
Connection type	NO NO + NC	PUR cable 3 x 0.25 PUR cable 4 x 0.25
Weight	0.3	mm <sup>2</sup> kg

### Ordering table

Connection cable		PNP NO	PNP NO + NC
5 m PUR	Irem	ESN10B050AP048LK05P-M	ESN10B050UP048LK05P-M
	Order No.	<b>ESN 088 769</b>	<b>ESN 088 771</b>

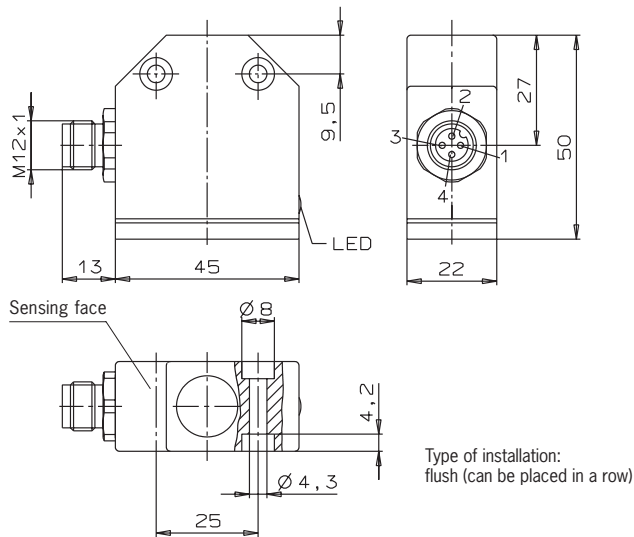
Other cable lengths on request. Output NPN NO + NC on request.

## Inductive single limit switches type series ESN...

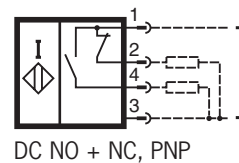
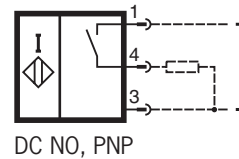


1)

### Dimension drawing



### Wiring diagrams



### Technical data

Parameter	Value	Unit
Rated operating distance $s_n$	5	mm
Assured operating distance $s_a$	0...4	mm
Output and switching function	PNP NO or PNP NO + NC (see Ordering table)	
LED function indicator	yes	
Operating voltage $U_B$	DC 10...55	V
Voltage drop $U_d$	$\leq 2.5$	V
Rated insulation voltage $U_i$	DC 60	V
Rated operating current $I_o$	$\leq 250$	mA
Off-state current $I_r$	$\leq 0.05$	mA
No-load current $I_0$	$\leq 15$	mA
Short-circuit and overload protection, pulsed	yes	
Reverse polarity protection	yes	
Wire break safety	yes	
EMC compliance according to	IEC 60947-5-2	
Differential travel H	$\leq 0.5$	mm
Repeat accuracy R	$\leq 5$	%
Switching frequency f	$\leq 500$	Hz
Utilization category according to IEC 60 947-5-2	DC-13	
Housing material	Die-cast aluminum, anodized	
Material for the sensing face	PBT	
Ambient temperature T	- 25...+ 70	°C
Connection type	M12 plug connector <sup>2)</sup>	
Weight	0.1	kg

1) Degree of protection only guaranteed on the usage of the plug connector on page 25.

2) For the relevant plug connectors see page 25.

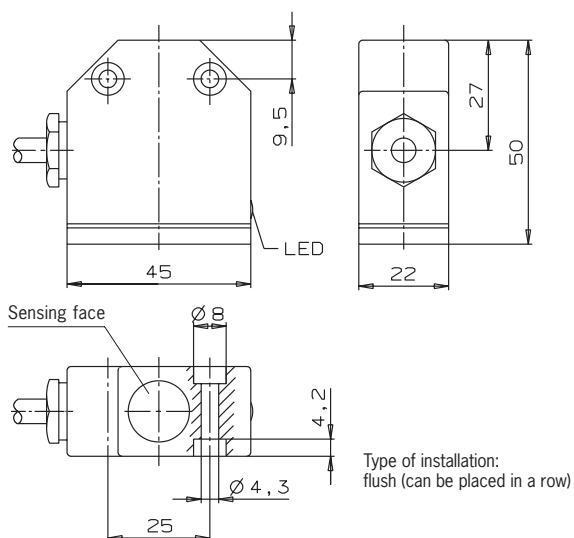
### Ordering table

Plug connector system		PNP NO	PNP NO + NC
Plug connector S01 (M12, 4-pin)	Item	ESN10B050AP048LKS01-M	ESN10B050UP048LKS01-M
	Order No.	<b>ESN 090 439</b>	<b>ESN 088 770</b>

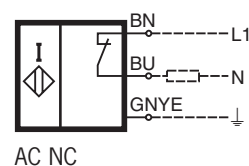
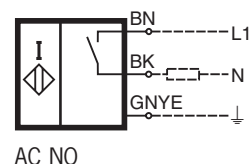
## Inductive single limit switches type series ESN...



### Dimension drawing



### Wiring diagrams



### Technical data

Parameter	Value	Unit
Rated operating distance $s_n$	5	mm
Assured operating distance $s_a$	0...4	mm
Switching function	NO or NC (see Ordering table)	
Output	AC	
LED function indicator	yes	
Short-circuit protection	No	
Operating voltage $U_b$	AC 20...250	V
Voltage drop $U_d$	$\leq 8$	V
Rated insulation voltage $U_i$	AC 250	V
Rated operating current $I_b$	$\leq 250$	mA
Inrush current $I_k$ (20 ms)	1.5	A
Off-state current $I_o$	$110 \text{ V} \leq 1.5 \text{ 230 V}, \leq 2.0$	mA
Operating current, minimum $I_m$	5	mA
EMC compliance according to	IEC 60947-5-2	
Differential travel H	$\leq 0.5$	mm
Repeat accuracy R	$\leq 5$	%
Switching frequency f	$\leq 10$	Hz
Utilization category according to IEC 60 947-5-2	AC-140	
Rated line frequency	50 ... 60	Hz
Housing material	Die-cast aluminum, anodized	
Material for the sensing face	PBT	
Ambient temperature T	- 25...+ 70	°C
Connection type	PVC cable 3 x 0.5	mm <sup>2</sup>
Weight	0.3	kg

### Ordering table

Connection cable		NO	NC
5 m PUR	Item	ESN10B050AW250LN05V-M	ESN10B050RW250LN05V-M
	Order No.	<b>ESN 088 773</b>	<b>ESN 088 774</b>

Other cable lengths on request.

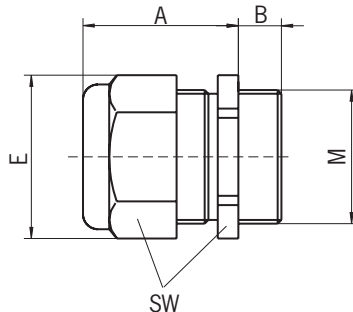
## Accessories

### Cable glands

EUCHNER multiple limit switches are manufactured and supplied with the degree of protection IP 67 according to IEC 60529. High-quality cable glands must be used to maintain this degree of protection.

The following table contains the cable glands suitable for the corresponding internal thread in the EUCHNER multiple limit switch and for the outer diameter of the cable used.

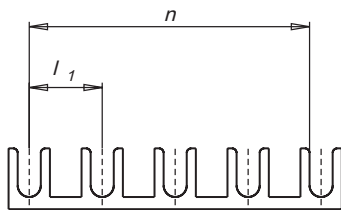
Material: brass, nickel-plated



Item	Metric thread M	Outer cable diameter [mm]	A [mm]	B [mm]	E [mm]	SW [mm]	Order No.
EKVM12/04	M12 x 1.5	4 - 6.5	20	5	15.5	14	086 327
EKVM16/04	M16 x 1.5	4 - 6.5	20	6	20	18	086 328
EKVM16/05	M16 x 1.5	5 - 8	20	6	20	18	086 329
EKVM16/06	M16 x 1.5	6.5 - 9.5	20	6	20	18	086 330
EKVM20/06	M20 x 1.5	6.5 - 9.5	20	6	24.4	22	077 683
EKVM20/09	M20 x 1.5	9 - 13	21	6	24.4	22	077 684
EKVM25/09	M25 x 1.5	9 - 13	21	6.5	31.2	28	086 334
EKVM25/11	M25 x 1.5	11.5 - 15.5	21	6.5	31.2	28	086 335

### Separate connector bridge

A separate connector bridge is available for making an electrical connection between individual switching elements with a common operating voltage.



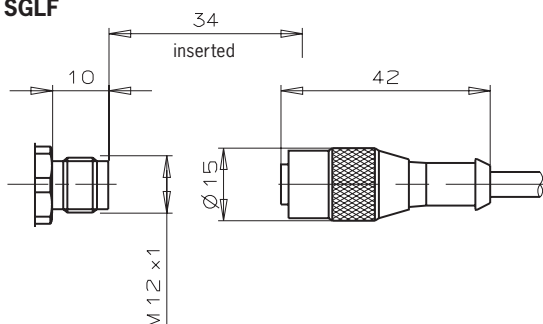
$l_1$	$n$ (Number)	Order No.
12	20	017 130
16	16	017 131

## Plug connector type series SGLF and SWLF

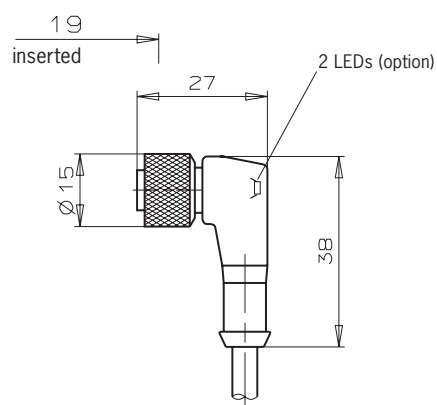


### Dimension drawing

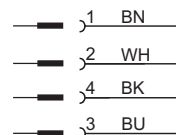
#### Type series SGLF



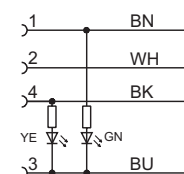
#### Type series SWLF



### Wiring diagrams



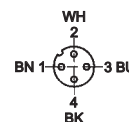
without LED



with LED

### Pin assignment

(view on the inserted end of the plug connector)



### Technical data

Parameter	Value		Unit
LED version	without LED	with operation and function indicator	
Number of poles	4		
Housing material grip/contact carrier	TPU, self-extinguishing		
Degree of protection according to IEC 60529	IP 67 (in the inserted and locked state)		
Ambient temperature	- 25 to + 80		°C
Contact material	CuZn nickel plated, 0.3 µm gold plated		
Connection type	PUR cable, molded		
Conductor cross-section	4 x 0.25		mm <sup>2</sup>
Rated voltage	250	10 - 30	V
Rated operating current I <sub>e</sub>	4	3	A
Weight	0.2		kg

### Ordering table

Versions	Item	Order No.
Straight plug, without LED, cable 5 m PUR	SGLF4-5000P	035 613
Elbow plug, without LED, cable 5 m PUR	SWLF4-5000P	035 618
Elbow plug, with 2 LEDs, cable 5 m PUR	SWLF4P-5000P	041 091

## Additional Products

### Precision multiple limit switches for high switching point accuracy and safety

EUCHNER offers precision multiple limit switches as an alternative to inductive multiple limit switches. There are four functionally different plunger ends available for various areas of application with 8, 12 or 16 mm plunger spacing respectively. The precision multiple limit switches can be assembled with snap and safety switching elements, or also in combination with inductive switching elements.

A type series with an external membrane which is designed to resist the effect of resinous cooling lubricants is also available. This version prevents the plungers from sticking.

#### Technical data

Housing material	anodized aluminum
Degree of protection	IP67
Actuator	chisel, roller, ball and dome plungers
Switching point accuracy, max.	± 0.002 mm
Approach speed, max.	120 m/min
Mechanical life	up to 30 x 10 <sup>6</sup> mech.operations



### Trip rails / trip dogs

#### U-trip rails

enable the adjustment of the trip dogs from the switch side. The trip dogs can be installed and adjusted quickly and easily in any location.

#### U-trip dogs

are designed for use in U-trip rails. They have an expansion plate clamp and enable precise adjustment, even when the limit switch is activated.

#### G-trip rails

enable the adjustment of trip dogs from the side opposite the switch. They are made of steel and are protected from corrosion by a special surface treatment. Trip rails can be ordered pre-assembled or as a component for self-assembly.

#### G-trip dogs

are designed for use in G-trip rails. The trip dogs are clamped in the trip rail by a hexagon socket screw with spring washer. This washer locks the trip dog in place even when the trip rail is in vertical position, and allows precise adjustment.





## Appendix

### Terms and explanations

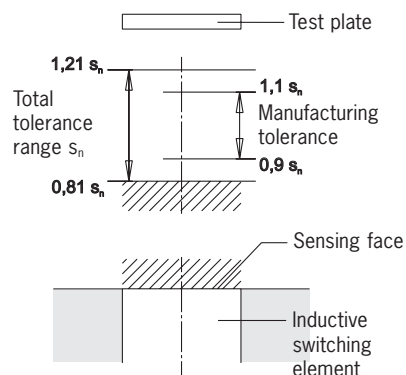
#### Rated operating distance $s_n$

The rated operating distance is a general variable used for measurement of operating distances. It does not take into account either the production tolerances or changes caused by external effects such as voltage and temperature.

#### Assured operating distance $s_a$

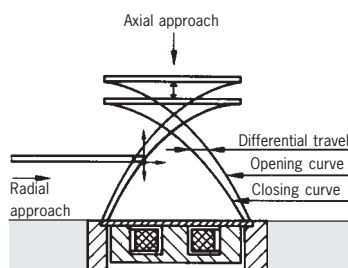
The assured operating distance is the operating distance at which correct operation of the inductive switching element is guaranteed within the permissible operating conditions (temperature and voltage).

The actuation distance lies between 0 and 81 % of the rated operating distance  $s_n$ .



#### Differential travel $H$

The differential travel is the difference in distance terms between the ON point as the test plate approaches and the OFF point as it moves away from the sensing face of the inductive switching element.



#### Repeat accuracy $R$

The repeat accuracy is the accuracy with which the real operating distance  $s_r$  is reproduced, for two switching actions in succession within 8 hours at an operating temperature of  $23 \pm 5 \text{ }^\circ\text{C}$  and an operating voltage of  $U_B \pm 5 \%$ .

#### Operating voltage $U_B$

The operating voltage defines the voltage range in which the inductive switching element functions reliably. The specified values represent limits without any tolerances. The values can be obtained by referring to the technical data for the switching element. In the case of two-wire switching elements, this is applicable only in series connection with the load.

#### Voltage drop $U_d$

The voltage drop is measured across the active output of the inductive switching element when the output is in the „through-connected“ condition and when the rated operating current  $I_o$  flows.

#### Rated operating current $I_o$

The rated operating current is the nominal current which can load the inductive switching element in continuous operation.

#### Off-state current $I_r$

The off-state current is the current which flows in the load circuit of an inductive switching element in the non-conducting condition. In practical terms, this current has to be taken into account only for two-wire switching elements.

#### Operating current, minimum $I_m$

The minimum operating current is the minimum current required for the functioning of a 2-wire switching element in active energized condition.

#### Inrush current $I_k$

The inrush current is the maximum current which can flow in an AC-2-wire switching element for a particular period at the moment it is switched on. The details in the technical data are valid for 20 ms.

#### Switching frequency $f$

The switching frequency is the maximum possible number of switching operations per second. This is determined according to IEC 60947-5-2 and is based on a mark-space ratio of 1:2. The switching frequency is a switch-specific variable and can be obtained by referring to the technical data for the switching element.

#### Ambient temperature $T$

The ambient temperature is the temperature range in which the reliable operation of the inductive switching element is guaranteed. This range is between  $-25$  and  $+70 \text{ }^\circ\text{C}$ .

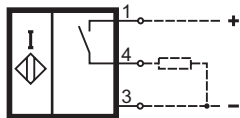
#### Temperature drift $\Delta s$

The temperature drift defines the offset in the switching point in  $\mu\text{m/K}$  on a change in the ambient temperature from  $-25$  to  $+70 \text{ }^\circ\text{C}$  under otherwise constant measurement conditions.

## Switching functions

### NO function

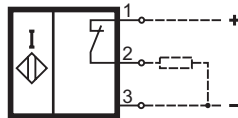
The NO function means that the load current flows when the sensing face of the inductive switching element is activated and that no current flows when the sensing face is undamped.



DC NO, PNP

### NC function

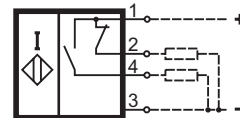
The NC function means that the load current does not flow when the sensing face of the inductive switching element is activated and that current flows when the sensing face is undamped.



DC NC, PNP

### NO + NC function

The NO + NC function incorporates both an NO function and an NC function. Associated circuit diagrams and wiring diagrams are given in the technical data.



DC NO + NC, PNP

## Suppressor circuits

The inductive switching elements are largely protected against external interference by use of various circuit techniques (suppressor circuits).

For utilization category DC-13 the output must be protected with a free-wheeling diode for inductive loads.

### Short-circuit and overload protection

The inductive switching elements are designed so that short circuits cannot damage the outputs. **Pulsed short-circuit protection** is used.

This means that the output transistor is switched off and on again in quick succession in the event of overloading or a short-circuit. In this way, it is possible to establish whether the fault is still present or has been rectified.

### Transient protection

EUCHNER proximity switches are protected against interference caused by the occurrence of inductive voltage peaks in accordance with IEC 801-4. The respective values are specified in the technical data. Testing is performed in accordance with the stipulations in DIN VDE 0660, Part 208 and IEC 947-5-2.

### Wire break safety

EUCHNER proximity switches with wire break protection are designed so that the switch does not output spurious signals in the event of a break in any connecting wire.

### Reverse polarity protection

Protection against reverse polarization of the operating voltage.

## Customized versions

### Inductive switching elements according to NAMUR

These switching elements fulfill the specification IEC 60 947-5-6 and IEC 61 934. The current consumption at  $U_B = 8.2\text{ V}$  is greater than 2.5 mA when the oscillator face is not activated and less than 1.0 mA when the oscillator face is activated.

The current consumption characteristic is linear during the transition from the inactivated to the activated state of the oscillator face, i.e. these switches do not have a snap action.

### DC-2-wire switching elements

Two-wire switching elements can be used in principle instead of mechanical switches. Their low off-state current makes them especially suitable for use in conjunction with programmable logic controllers.

Compared with three-wire switching elements they have the advantage of requiring less wiring.

### Increased operating distance

For designs with 12 mm proximity switch spacing, switching elements with increased operating distance are available on request ( $s_n = 5\text{ mm}$ ).

Due to their technical characteristics, these switching elements can be used both with a pulsed operating voltage and an operating voltage that is not pulsed.

